Fake News and Critical Thinking in Information Evaluation

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Abstract

In the post-truth era we are constantly bombarded with "news" which is fabricated, distorted, and massaged information, published with the intention to deceive and mislead others. Such "news" has come to be known as "fake news". The influence of fake news can have profound socio-political and cultural effects when translated into action. The ability to distinguish between real facts, fabricated stories, rumours, propaganda, or opinions is of paramount importance. The rapid proliferation of information through social media is now the norm. In this paper we consider the challenge of preparing students, in developing skills for recognising mis-information, dis-information and mal-information. We argue that critical thinking for evaluating information should now be considered a basic literacy, equally important to literacy itself, as well as information and information technology literacies.

In this paper we revisit Bloom's taxonomy of cognitive skills and represent what a learner can achieve at each level. We customise the traditional moral and ethical concepts suggested by the US Content Subcommittee of the ImpactCS Steering Committee to flag the ethical concerns over mis-information, dis-information and mal-information. We report on current levels of awareness and practices at the authors' five higher education institutions, and reveal varying levels of awareness of the significance of critical literacy and different practices in each location. The paper concludes with an outline of future work.

Keywords: critical thinking, critical literacy, fake news, post-truth, ethics, intellectual property, the role of librarians and academics

1. Introduction

Post-truth, which was declared by Oxford Dictionaries as its international word of the year in 2016, is defined as "denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief" (OED). In such circumstances, fake news finds fertile ground and appeals to emotions and personal beliefs. The Council of Europe defined fake news as, "information deliberately fabricated and published with the intention to deceive and mislead others into believing falsehoods or doubting verifiable facts," and was cited by Wardle and Derakhshan

(2017)." This definition has been adopted by the Ethical Journalism Network (EJN), (https://ethicaljournalismnetwork.org/tag/fake-news).

Post-truth affects all areas of endeavour. For example, Melville (2017) asserts that "Science is not immune to appeals to emotion and belief rather than fact". Marmot (2017), in his paper Post-truth and Science published in the Lancet medical journal, emphasises that "Truth is central to the core mission of the medical and scientific literature. What is the worst sin, work-related, a scientist can commit? Lying, stealing someone else's ideas is reprehensible but it acknowledges the importance of the ideas in the pursuit of truth. Lying, falsifying evidence means that we have no basis for communication. The whole enterprise crumbles."

The misappropriation of intellectual property also constitutes a form of truth manipulation, which can have far-reaching consequences. As most are aware, plagiarism amounts to stealing someone else's ideas and work, and takes two forms: it can be intentional such as submitting as your own someone else's unpublished work or unintentional, which arises where there is poor awareness of best referencing and citation standards and practices leading to acts of plagiarism (Roig, 1997). A study entitled "*Intellectual Property and Education in Europe*" covering public and private education was carried out 2013-2014 by the Office for Harmonization in the Internal Market (2015). The study carried out 40 field studies, analysed 36 questionnaires and over 1.500 documents from the National Ministries. The research objective was to investigate how Intellectual Property Rights (IPR), such as trademarks, designs, patents and copyright, as well as Intellectual Property (IP) related issues, such as ownership, authorship, originality, licensing, confidentiality, trade secrets and branding are being taught in primary and secondary schools (both general and vocational) in the 28 EU Member States. One interesting finding of the survey was that between 35% and 50% of young Europeans display attitudes which favour illegal downloading from the internet. Similarly, a study including 100 Greek Information Technology (IT) students showed that 52% do not have any hesitation to make unauthorised copies of commercial software to use at their homes (Voutsa et al, 2006).

The results of the "*Intellectual Property and Education in Europe*" study showed that no specific standalone IP subject or comprehensive IP education programme exists in the current official curricula of the countries analysed. Some IP and IP-related themes are however, integrated into one or several subjects throughout all education levels.

IPRs are central to commercial success due to the fact that they give owners the opportunity to protect their creation(s). Illegal use and production of products covered by IPR, (called IPR infringement which covers patents, trademarks, designs or copyright) are increasingly counterfeited through Information and Communication Technologies (ICTs) and the Internet.

IPRs are essential for stimulating innovation and creativity. Knowledge assets usually have the property of non-rivalry in consumption, but in some cases, they also have the property of non-excludability to access (Chou, and Passerini, 2009). In these cases they are called public goods. When everyone can freely access knowledge goods, knowledge may suffer from the typical free-rider problem that can lead to its under-production. In these cases those who contribute to the creation of knowledge are less motivated to continue to do so because they have no rewards or benefits and/or others do not contribute equally (thus free-ride on their production/innovation). One solution to the under-production problem resulting from free-riding is to increase the incentives for knowledge creation with a stronger regime of IPRs. This, however, creates monopolistic profits given by IPRs and leads firms to focus on knowledge as a club (private) good rather than a public good. Examples are pay-per-view option of cable TV, where only the members of the club have exclusive access to the good. An IPR regime that is too strong may limit the circulation of knowledge and impede further innovation, particularly in the developing countries. In contrast, the recent development of Creative Commons/Free Software movements can improve free access to knowledge. *"For sustained (knowledge) development to take place, countries need to establish mechanisms that facilitate the circulation of data, information and knowledge across developing and developed nations"* (Chou, and Passerini, 2009). Samuelson (1994) provides arguments in favour of self-plagiarism, which seems to be more acceptable than plagiarism of somebody else's work.

Willinsky and Provençal (2013) conclude their study for intellectual properties of learning: "Our belief is that a critical understanding of literacy, for the digital era, can benefit from a greater regard for intellectual property as a way of thinking about the role of *the university in using public and private resources in creating value, sharing knowledge and advancing learning."*

The ethical implications around fake news are just as important; thus educators have a responsibility towards their students to foster critical thinking for evaluating information, which in turn informs their decision making. The ability to distinguish truth from falsehood is important in many contexts and at many levels i.e. the personal, group, project, organisational, political, and societal. Anderson and Rainie (2017), quoting Jamais Casgio, warn that "The crisis we face about 'truth' and reliable facts is predicated less on the ability to get people to believe the *wrong* thing as it is on the ability to get people to *doubt* the right thing."

The societal impact of fake news can be immense as it creates *information pollution***.** Wardle and Derakhshan (2017) warn that the long-term implications of dis-information campaigns are designed specifically to sow mistrust and confusion and to sharpen existing socio-cultural divisions using nationalistic, ethnic, racial and religious tensions. In their Information Disorder Report they identify three types of untrustworthy information namely: *mis-information, dis-information, and mal-information,* as shown in Figure 1 which also shows the overlap between these three types, as well as their respective potential impacts as defined by the Council of Europe.

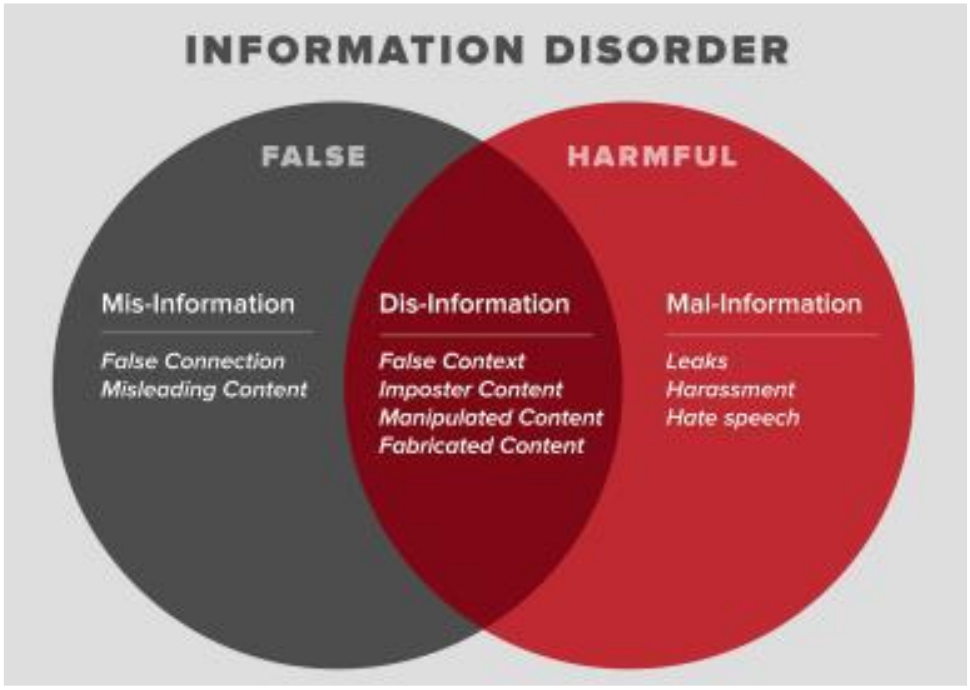

Figure 1: Information Disorder [Source Wardle and Derakhshan, 2017]

Dis-information: Information that is false and deliberately created to harm a person, social group, organization or country.

Mis-information: Information that is false, but not created with the intention of causing harm.

Mal-information: Information that is based on reality, used to inflict harm on a person, organization or country.

2. The Challenge of Developing Critical Thinking

2.1 Critical Thinking: A basic competency

The challenges posed by the proliferation of technologies, platforms and media through which information in multiple formats is created, propagated, and shared, exacerbate an already difficult problem. It is thus imperative for everybody, but for educators in particular, to support the development of critical thinking skills in their students.

Critical thinking is one of the cognitive skills proposed by Benjamin Bloom in his taxonomy which he developed in 1956 (Bloom, 1956). It has been used extensively by educators to classify learning objectives, and as a tool for assessing outcomes. Subsequent extensions, updates, enhancements, and implementations to specific knowledge domains, have been proposed by many researchers and educators over the years, with more recent contributions from Anderson and Krathwohl, (2001); Berki and Valtanen (2007); Keene, et.al., (2010); and Adams (2015).

Berki and Valtanen (2007) asserted that "critical thinking is now widely seen as a basic competency, akin to reading and writing skills, which need to be taught. Critical thinking is a skilful activity, which meets standards of clarity, relevance, adequacy and, thus, is contrasted to unreflective thinking".

Bloom's taxonomy with some additions (shown in the left (upright) triangle in Figure 2) suggests that critical thinking is necessary from the fourth level, i.e. Analysis. The inverted triangle in Figure 2 depicts the learning outcomes that a learner can achieve at each level. The hierarchical representation proposed by Bloom, and used widely for over for over 60 years, denotes that each level rests on the foundations of all the previous levels. The inverted hierarchy we added here (second triangle) is a schematic representation of the things a learner can achieve at each level. As the levels rise the learner is not only able to do more but also demonstrates higher level cognitive skills.

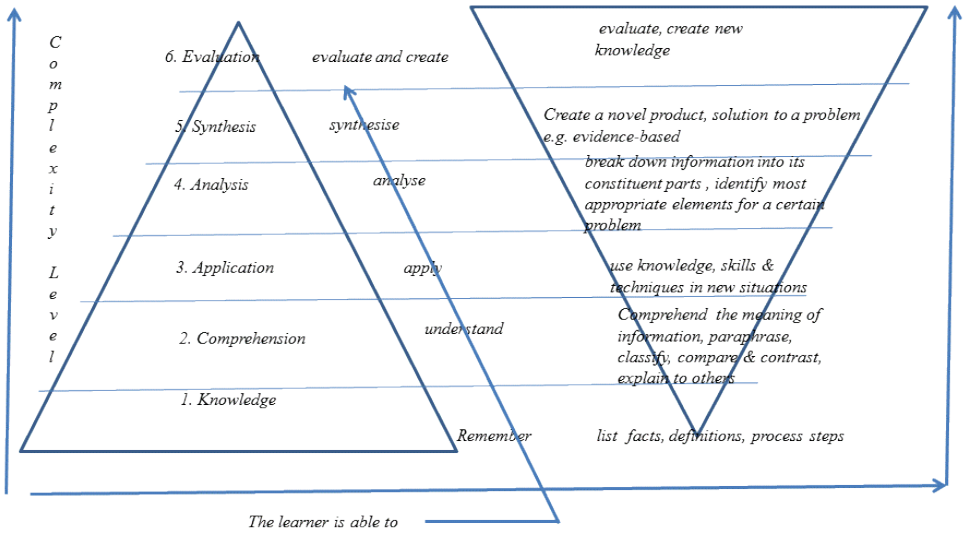

Figure 2: The learner is able to……[Based on Bloom's Taxonomy] Constructive alignment between level of complexity and learning outcomes.

Fisher (2001) cited in Berki and Valtanen (2007) explained that critical thinking skills require the ability to interpret, analyse and evaluate ideas, arguments and observations. Critical thinking also requires skills in thinking about assumptions, in asking pertinent questions, in drawing out implications, all of which are necessary skills for students in all fields of study.

2.2 Critical Information Literacy

In April 2018, the Information Literacy Group of CILIP in the UK published a new definition of Information Literacy to update its widely-used 2004 version. The new articulation places critical thinking and discernment at its core, and reflects the more nuanced definitions of recent years which focus on context, individual agency, and the empowerment of citizens, rather than generic sets of skills and abilities to be acquired (e.g., the ACRL 2015 Information Literacy Framework; UNESCO's Media & Information Literacy definition):

"Information literacy is the ability to think critically and make balanced judgements about any information we find and use. It empowers us as citizens to reach and express informed views and to engage fully with society" (CILIP Information Literacy Group, 2018).

The ability to analyse and interpret media messages, irrespective of channel or format, is inextricably linked to self-determination, freedom of expression, democracy, and ethical information behaviour; UNESCO cites Media & Information Literacy as "an important prerequisite for fostering equitable access to information and knowledge and promoting free, independent and pluralistic media and information systems" (UNESCO, 2017), while CILIP emphasises the central role of Information Literacy in reinforcing "democracy and civic engagement" (CILIP Information Literacy Group, 2018).

The power of media and increasingly, *social media*, in influencing world events was highlighted in recent times by two unprecedented political events; firstly in June 2016, the result of the UK referendum to leave the European Union, and secondly, the outcome of the US Presidential Election in November 2016. While official polls had consistently predicted the opposite outcome in both cases, the deep polarisation that had been evident on social media channels told a different story, and led to concerns about the "filter bubble" effect of social media applications and search engines such as Twitter, Facebook, and Google (Pariser, 2011) and their potential influence on voter behaviour and electoral outcomes. The filter bubble phenomenon refers to the increasing personalisation of Internet search engines and social media feeds and timelines, which employ algorithms to channel content towards users that is aligned with their personal values, beliefs, emotions, and preferences, and to decrease exposure to contradictory viewpoints and perspectives, thus creating a sense of intellectual isolation that may have far-reaching societal and political effects if translated into action. Pariser describes them as "*predictive engines, constantly creating and refining a theory of who you are, and what you'll do and want next" (2011, p.9)*. This digital echo chamber effect is thus only amplified by the rapid, in some cases viral, circulation of unsubstantiated, biased or deliberately falsified media reports – or fake news, as it is now commonly known. According to Gunther, Nisbet & Beck (2018), a study which analysed almost 25,000 social media messages shared by Michigan voters during the US presidential election, "identified nearly half as 'unverified WikiLeaks content and Russian-origin news stories' that fall under the definition of propaganda based on its use of language and emotional appeals." Although it is difficult to measure the precise influence of fake news on voter behaviour, the rising number of people who obtain their news primarily from social media (Gottfried & Shearer, 2016) suggest that it is a concern that should be taken seriously.

When viewed from this high-stakes perspective, it is clear that information literacy must encompass more than the ability to discern "good" from "bad" information along the traditional academic lines of authority, currency and relevance, although these are still important criteria; rather, in this context, critical thinking should now extend to awareness and understanding of the dominant power structures that control information production and dissemination, the socio-political environments in which authority is constructed, and the interests and agendas of those who are responsible for the circulation.

These perspectives are captured in the idea of critical information literacy, which is defined as "a way of thinking and teaching that examines the social construction and political dimensions of libraries and information, problematizing information's production and use so that library users may think critically about such forces" (Tewell, 2018). Critical information literacy purports to cultivate a critical consciousness in students and a sense of personal agency in enacting social change in the world, and encourages them to "identify and act upon oppressive power structures" (Tewell, 2015, p.36). It requires students to critically examine the status quo in any given context, and to ask difficult questions about the prevailing socio-political structures that privilege some, but exclude others.

To this end, the Global Digital Citizen Foundation has published a lengthy "critical thinking cheat sheet" of questions to ask when new information is encountered; these are questions that include, but also go beyond, the surface-level evaluation of quality, to interrogate the assumptions, privileges and agendas that underpin media messages (Global Digital Citizen Foundation, 2016). For example, one can ask:

> Who benefits from this? Who is it harmful to?
> What is a counter-argument? What can we do to make a positive change?
> Where is there most need for this? Where in the world would this be a problem?
> When is this acceptable / unacceptable? Why should people know about this?
> How do we know the truth about this? How can we change this for our good?

The perspective of critical information literacy challenges the traditional conceptions of good and bad information, and compels students to ask not only if information is reliable, truthful and trustworthy, but also what or whose cause it serves, the context in which it arose, and who may be disadvantaged by it. In an era when "fake news" may not be factually incorrect but may be spun to convey a particular agenda or point of view (media bias), the ability to discern the wider context and interpret the true meaning of the information is more valuable than ever.

3. Ethical Issues & Critical Information Literacy

Critical information literacy dictates that in order to become a responsible creator, disseminator and consumer of information, then one must be able to examine and understand the standards for the rightness and wrongness of actions.

3.1 Ethical Framework and Critical Information Literacy

The US Content Subcommittee of the ImpactCS Steering Committee (Huff et. Al., 1995) advocated a framework presenting a set of traditional moral and ethical concepts that could be used to flag potential ethical issues in a given concern. In terms of personal and professional responsibility, the committee recommended the following six traditional moral and ethical concepts:

1. Quality of life	2. Use of Power
3. Risks and reliability	4. Property Rights
5. Privacy	6. Equity and Access

Table 1 shows the theoretical framework developed by the US Content Subcommittee of the ImpactCS Steering Committee which we customized. The framework specifies six moral and ethical concepts, shown in Column 1, that can help identify the social, legal and ethical issues invoked by the creation, ownership, dissemination and utilisation of information. We added brief commentaries, shown in Column 2.The ethical concepts listed are at the heart of critical information literacy, in promoting awareness and understanding of the power structures, human rights and equality issues, and overall impacts on humanity that are inherent in the production and consumption of information.

Table 1: Traditional moral and ethical concepts suggested by the US Content Subcommittee of the ImpactCS Steering Committee customized to flag the ethical concerns over misinformation, disinformation and malinformation.

Ethical Issue	**Commentary**
Quality of Life	The concept of quality of life must be taken into consideration when examining ethical issues concerning Information Literacy (IL) and critical thinking. IL is defined as a fundamental basic human right yet there are many who do not have the right to exercise it. Information competencies are a key factor in lifelong learning. Information Accessibility and IL can help disadvantaged groups in both the developed and developing worlds improve their opportunities for achieving their intellectual potential, playing a full role in society, reducing isolation and social alienation; promoting community harmony and reducing tensions.
Use of Power	There is the long-standing problem: who gets to decide what is or is not a lie. For example, can a nation state author and implement new legislation, which makes the dissemination of "fake news" punishable via imprisonment? What if authorities are sanctioned to issue heavy fines if anyone is found to be sharing news on social media that the authorities decide is false? The answer, at first glance, may seem obvious. But this principle of *Use of Power* prompts the important question: who is the ultimate arbiter? Free Speech is a fundamental human right and so should the responsibility of arbitration be entrusted to: mainstream media organisations, governments, social media platforms, etc.? When tackling the concerns over "fake news" we must ensure that this does not become a smokescreen for silencing genuine free speech.
Risks and Reliability	All information is used in a world where consumers, users, and the public in general rely on its accuracy, authenticity and fidelity. Bias and error in information must lead information professionals to become familiar with the inevitable risks associated with the utilisation of information. Questions over who is held accountable for errors in information; what should be the reparations to injured parties; how to measure the credibility of an author; etc. will always involve ethical dimensions and information professionals should be prepared for them. Decisions based on misinformation, disinformation and malinformation can lead to implementation of solutions that have adverse effects at a personal, community and national level.
Property Rights	The question "who owns the information" may lead to simple ethical issues of giving credit or if appropriate, to ask permission to use the intellectual and creative ideas of others are not the only concerns that information professionals and citizens will have to deal with in the domain of property rights. This principle of Property Rights also demands careful thought regarding property rights. This principle invokes thought provoking questions, such as: who in society and communities are permitted to create information; what are the just and fair prices for the exchange of information; and who owns the channels through which its distribution is controlled?
Privacy	The Right to Privacy is explicitly stated in the UN Universal Declaration of Human Rights. In a digital, online world this principle holds truer. For example, the improper sharing of user data by social media platforms with analytics firms tied to presidential campaigns are a gross violation of such a scared, enshrined principle. Safeguards need to be implemented, enforced and policed to ensure that general data protection rights are not abused in order

	that citizens are confronted by fake news that is created and disseminated by authorities/organisations.
Equity and Access	There is a need to make the distinction between fake news and media bias. The latter is defined by Levasseur (2008) as "the media exhibiting an unjustifiable favoritism as they cover the news. When the media transmit biased news reports, those reports present viewers with an inaccurate, unbalanced, and/or unfair view of the world around them". In other words a misrepresentation of real news and facts in order to push a partisan narrative. The principle of Equity and Access would demand that every citizen/community has a right to have their narrative respected, disseminated and shared equally. The principle demands that their respective narratives are not omitted; are fairly selected; fairly promoted and labelled. In discussions over fake news and media bias in a digital world, what must not be lost sight of is that 80% of the world's population lives in abject poverty where the world's poor are excluded from the information revolution outright. Therefore, information professional must be instructed that their opinions on these matters should not simply be based on empirical evidence, but must also be grounded in careful ethical reasoning about issues of equity and access in current society.

Thus, in order to become more responsible information professionals and citizens in general it is imperative that, in supporting critical information literacy development in students, both learners and teachers are made aware of the moral and ethical concepts spelt out in the framework presented in Table1. It is only through comprehending the issues raised by the framework that trainees and students can achieve a better understanding of the social, legal and ethical issues concerning fake news and mis-information, dis-information and mal-information.

4. Critical Literacy: A case study

4. 1 Context

The Librarians at Middlesex University typically deliver 1900 hours information literacy teaching each academic year. This is a 119% increase on teaching hours compared with ten years ago and demonstrates the increased emphasis on information literacy as an academic and lifelong skill. Our librarians have been proactive in transforming their pedagogical practice, through a greater awareness of learning and teaching theories and the use of activities and games-based learning (Edwards, 2016).

Our experience is that students are no more skilled at critically evaluating information than previous generations. Despite their increased use of technology and immersion in a digital world (White and Le Cornu, 2011), they continue to lack the "digital wisdom" (Prensky, 2009) to use information judiciously. As Goldstein (2015) comments, there is a "tendency to view digital skills in largely technical, ICT terms, without paying sufficient heed to the necessarily close relationship between digital and information literacies". Yet this is not enough in a globally connected society which must focus on information use, not the use of information technology (Johnston and Webber 2003, p.335). What is needed are citizens who have developed "…a high-level, reflective understanding of information situations, and to generate strategies for evaluating, analysing and assimilating that information as needed and at a time it is required…" (Secker and Coonan, 2011, p.4).

This raises the question as to whether academic staff also have the required information literacy expertise. In our experience there is a circular issue: Academic staff who recognise the need for good information literacy and who collaborate with the Librarians to develop the curriculum will develop information literate students. The risk is that academic staff who have had little or no information

literacy development themselves, assume this is something which simply "develops gradually and intuitively" (McGuinness, 2006) or by "osmosis" (Weetman, 2005). McGuinness (2006) notes that there is on the one hand an assumption that students will voluntarily avail themselves of the information literacy teaching on offer but, also a perception that students are sometimes extrinsically motivated to do the minimum required to pass the assessment. There is an inherent conflict here.

So how can a university develop critical information skills in students which sustain them through their studies, and into the workplace as well as becoming a valuable life skill? One option might be to utilise an information literacy curriculum such as ANCIL (Secker and Coonan, 2011) as is being used at the University of Maynooth in the Republic of Ireland (Dodd, 2017). However, this approach requires institutional support and commitment at the highest level and significant changes to the curriculum. The pragmatic alternative, developed over the past seven year at Middlesex University Library, has been to significantly change how we teach, using games and activities as the vehicle to encourage reflection, engagement and interaction in information literacy workshops (Edwards and Hill, 2016, pp. 74-94). An example of a gamified activity used by Librarians at Middlesex University is provided in the next section.

4.2 The game

This simple card sorting game is used to encourage thinking and reflection about the integrity of information and was inspired by Amanda Clossen, Learning Design Librarian, from Penn State University, USA (Closson, 2014). The game comprises 22 laminated cards and is ideally played in groups of three, so for example 10 sets will be required for a class of 30.

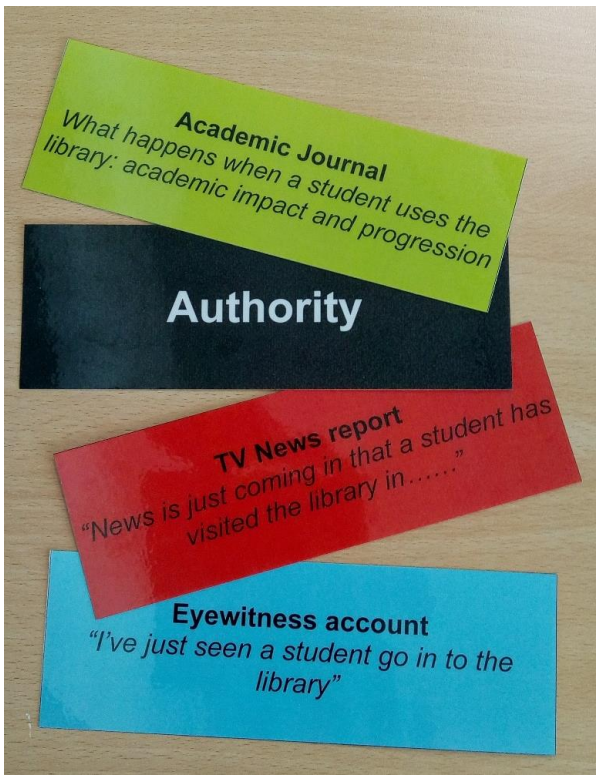

Figure 3: Example cards used in activity

Each set contains 2 black cards labelled Authority and Currency, plus a duplicate set of 10 cards depicting a range of information sources from Tweets and blog posts through to conference proceedings and Movies.

The activity starts with a discussion around the meanings of the words currency and authority in the context of academic information.

Currency: How old is the information? When was the information last updated? What has been updated?

Authority: Who is the author? What are their qualifications and status as a source of information? How has the quality of the information been verified?

Each group is then given a pack of cards. Students rank each set of the information sources regards their Authority and Currency.

> The way the students rank the resources will vary, and these choices are vital to prompt further discussion and reflection during feedback for example: Which source offers the most authority? Why?
>
> Which source has the least currency? Why?
>
> Do blogs and Tweets have authority?
>
> Are eyewitness accounts always current?

Although there are no right or wrong answers the sorted cards will look something like what is shown in Table 2:

Table 2: Possible ranking of information sources

Authority	**Currency**
Academic journal	Eyewitness account
Conference paper	Tweet
Book	Blog post
TV documentary	TV news report
Newspaper article	Newspaper article
TV news report	TV documentary
Blog post	Conference paper
Tweet	Academic journal
Eyewitness account	Book
Movie	Movie

This game can be freely downloaded from http://libguides.mdx.ac.uk/MDXGames/Computing. Full instructions on how to use it are in the 'Complete Overview' document on the same web site: http://libguides.mdx.ac.uk/MDXGames.

4.3 The value of this approach

This approach has significant advantages for the teacher librarian. The activity is student centred and uses a constructivist approach (Biggs, 2003). Through the activity we scaffold on their existing knowledge of information sources and introduce them to academic sources that they will be less familiar with including academic journal articles and conference proceedings. Students learn through discussion, reflection and experimentation in a "safe environment" (Walsh, 2014, p.41). The librarian is facilitating rather than didactically presenting information. For the teacher librarian this approach also means that no class is the same as the discussion varies depending on the students' experiences and knowledge. This makes for interesting teaching and keeps the sessions fresh.

The activities succeed because they "make the not-so-fun work into something less painful and even enjoyable" (Kim, 2012, p. 468). This is consistent with the constructivist approach to teaching used at Middlesex University whereby "…everything the learner perceives is tested against their prior knowledge; if the perceived content is consistent with the learner's mental model of the world, it becomes new knowledge and is assimilated with what the learner already knows" (Frazer et al., 2014, p14).

4.4 Taking this forward

The case study above demonstrates effective changes in library information literacy practice. We find that academic staff participating in these sessions not only see what the students are doing, but also improve their own information literacy (Edwards and Hill, 2016). This leads to further development as academic staff see the potential of what we do. A session on the use of games and activities in information literacy is shortly to be run by the Librarians as part of the PGCert Learning and Supporting Teaching in Higher Education programme at Middlesex University. Such collaboration and dialogue, on both sides, is vital if we are to design in good practice and equip the students with the skills they need to succeed (Saunders, 2012). The ideal outcome is, of course, that information literacy becomes an embedded and integral part of all curricula so everyone can benefit from enhanced information literacy.

5. Current Practices

5.1 Middlesex University, London, UK

In addition to the case study at Middlesex University, described in section 4, curriculum development (particularly for postgraduate programmes) as well as teaching and learning at Middlesex University is very much aligned to Bloom's taxonomy and its related learning outcomes outlined in Figure 2., and the Bologna principles (Murtonenet al., 2017). Information literacy is embedded into the course curriculum so that the students can engage with the process of critical literacy; it involves:

(1) Designing the course-work specification carefully where the students are encouraged to move to the level 4 (Analysis) and level 5 (Evaluation) stage in Bloom's level of complexity.
(2) The critical literacy training is embedded in content delivery and supported by library services where on-hand training is provided to the learners demonstrating 'why', 'who', 'what' and 'how' process of critical thinking.
(3) Learners are encouraged to evaluate the 'information obtained' using different evaluation metrics, i.e. impact factor, number of citations made to an article etc. Using 'impact factor'

as a parameter to determine the 'worthiness' of information is a part of the requirement of assessment specification.

(4) 'Critical Thinking' and 'critical literacy' programme is delivered by the Library Services as a university wide 'critical thinking' awareness programme. 'Literacy service' offers a service to the learners to provide formative feedback on the students' writing, this includes, i) identifying gaps in writing; ii) Commenting on paraphrasing and plagiarism.

(5) A final presentation of learners' work demonstrates their ability to explore, synthesise, analyse and evaluation of information obtained and perceived.

Embedding 'critical thinking' into the course curriculum has proven very effective. Learners demonstrate the critical thinking ability in all domain of learning.

From a broader perspective, Middlesex University has also been participating as co-ordinator or partner in a large number of EU Projects for Digital Libraries, Curriculum Development and Pedagogic knowledge transfer involving large number of EU member countries and various countries from the Balkans, the Caucasus, Central Asia, and the Middle East. Through these knowledge transfer activities it has been established that there exists substantial variation of both awareness and practices in the development of critical thinking and critical literacy not only among European countries but across the European Higher Education Area (EHEA). This uneven development coupled with the recent proliferation of fake news present considerable challenges.

5.2 ATEI Thessaloniki, Greece

At ATEI of Thessaloniki individual lecturers provide guidance on research methods, paraphrasing and citing sources, especially when they supervise final year degree projects or Masters dissertation. In addition, the library provides seminars in plagiarism. In different modules these issues are mentioned as good practice for students when handing out assignment specifications, final year projects or other tasks required by the curricula. In the first semester of the department of Informatics there is a module entitled 'Communication Skills' where plagiarism is one of the themes discussed.

5.3 University College Dublin

In UCD, information literacy and critical thinking are viewed as core academic, professional and lifelong skills, as well as desirable graduate attributes; the UCD Library Strategy 2016-2020 presents one of its key priorities as "Enabling students to develop the aptitudes and skills necessary to critically and ethically navigate the information environment, and to flourish in the rapidly evolving knowledge, information, digital and global societies" (p.9).Through working with academics to embed information literacy into the curriculum, redeveloping library space to facilitate individual and group-based learning, and creating a wide-ranging programme of instruction, the library plays an invaluable role in the development of these skills in students at all levels. Students avail of LibGuides, online tutorials and face-to-face workshops to meet their instructional needs. Undergraduate students on the university's BA and BSc Social Science programmes may also take the level one "Digital Judgement" module, which is offered by the School of Information & Communication Studies, and aims to foster critical digital and information literacy skills in first year students, who are making the challenging transition from secondary to tertiary education. In this module, students are introduced to core issues including digital scholarship, information evaluation, the academic web, critical information literacy, digital footprints, and online security. Through a blend of face-to-face classes, team digital projects, e-tutorials and independent reading, students learn how to operate effectively, intelligently, ethically and safely in the digital world.

5.4 University of Bihac, Bosnia and Herzegovina

There had been no awareness on Information Literacy (IL) in Bosnia prior to the launch of the RINGIDEA European Union Tempus Project [517117-TEMPUS-1-2011-1-IE-TEMPUS-JPHES (2011-2506/001-001]. The aims of the project, which have been fully achieved, were to: Develop Information Literacy (IL) programmes of Lifelong Learning (LLP) and their use in curricula as

appropriate in Western Balkan countries; harmonise the IL programmes with those currently active in Western Balkan countries, including the integration of IL programmes with existing initiatives; strengthen the capacities of higher education institutions for the strategic planning and implementation of IL programmes to develop transferable skills for a competitive, dynamic, knowledge-based economy; develop IL policy, guidelines, goals, missions, e.g., guidelines for developing IL programs, online IL modules, disseminate information about the approaches to IL development; and ensure the sustainability of project results through workshops, publications, project website, interaction with National and International stakeholders, and society at large.

Throughout the lifetime of the RINGIDEA project great strides were taken in Bosnia and the Western Balkans region. At the same time the annual Western Balkan Information Literacy Conference (WBILC) has been providing a forum that brings experts to share knowledge, exchange ideas and create a large international network of IL Practitioners who together can deal with challenges posed by new technologies, and practices.

Although great steps forward have been achieved, there are still obstacles that need to be addressed, such as the lack of professional staff in libraries, for example in the University Library of Bihac, Bosnia and Herzegovina, there are only two graduated librarians working. That was the reason to continue with further education of libraries' staff and development of libraries network support system in the area of Western Balkan through another Erasmus + project (LNSS-Library Network Support System in Western Balkans) providing staff development in the libraries.

Academics also need to develop curricula on Critical Literacy so that, together with librarians, they can face the difficult challenges of developing critical thinking for the evaluation of information.

5.5 Limerick Institute of Technology, Ireland

At Limerick Institute of Technology (LIT) Library Service, information literacy (IL) development is strongly supported and cultivated and is incorporated into a number of key Institute-wide policies at both the level of the organisation and at the library level. The Library has been implementing Information Literacy Programmes at the Institute now for over 15 years, focusing on key areas such as Referencing, Citation and Avoiding Plagiarism, Information Discovery, Literature Review and many others. LIT are also highly active in the area of European Union funded projects covering the Information Literacy and Library domains. Hence they have a dual focus. On the one hand they develop and embed Information Literacy and modernise libraries in large scale EU library projects in regions such as the Western Balkans, through Central Asia, Asia and many parts of the Russian Federation. At the same time they ensure delivery of the Information Literacy Programme on the institutional level for the benefit of LIT students and staff.

The IL programme at LIT is comprised of a number of development strategies, which incorporate working closely with academics to deliver in class IL teaching, Online Information Literacy Modules, workshops, face to face appointments with subject liaison specialists, IL lunchtime classes. The Library has published a number of policies and procedures in the Information Literacy domain covering areas such as Referencing, citation and avoiding plagiarism that have been adopted by the Academic Council of the Institute as the official campus-wide policy and authority in this area. The Library has also shared these publications with universities and libraries in countries in regions highlighted earlier where they have been adapted thus cultivating important exchange of experience and knowledge sharing on the international level.

In developing information literacy on the institutional, national and international levels, LIT are committed to embedding IL into curricula in organizational structures using various methods to suit the context, as have been solidly explained by Peacock (2004) and her three pronged, progressive approach to embedding information literacy into higher education institutions through extra-curricular (supplemental), inter-curricula (integrated) and intra curricular (embedded) means.

5.6 Growing Awareness for the need for Critical Literacy

Our investigation revealed that there seems to be evidence of growing awareness among staff (academics and librarians) of the need to develop critical skills among students at least at the institutions of the authors of this paper. In some universities there is already successful practice in imparting critical skills. There is considerable room for improvement to respond to complications and challenges posed by large amounts of mis-information, disinformation and mal-information. Thus introducing and implementing Process Improvement Initiatives needs to be formalized and monitored.

As discussed in the previous sections of this paper there is a need to develop greater awareness of the problems created in the post-truth era and by fake news proliferation. Students, researchers and people in general need to be able to distinguish between credible and reliable information, and erroneous, distorted, untruthful or malicious information. Nowadays due to the ease and speed with which news and information are shared using new technologies and social media. This need is becoming increasingly pressing. Strategies and practices for developing critical thinking and critical literacy in learners seem to be either absent, nebulous or sporadic. Most Higher Education institutions have no dedicated units/modules but some aspects are dispersed across various modules in the curricula. We propose that whenever new programmes of study (diplomas, degrees, masters or doctoral) are introduced or revalidated dedicated modules (or part of existing modules as is the example implemented at the ATEI (see 5.2) on Critical Literacy be developed and introduced.

6. Conclusion

In the post-truth era, everybody should be aware of the fact that certain individuals, organisations, agencies and even governments may generate mis-information, dis-information, or mal-information. At the same time, all of these actors can also be the victims of such information. Thus, awareness of the dangers of fake news, and the means of discerning the truth and credibility of information, are of paramount importance. By far the best strategy for dealing with these problems is the development of critical thinking and critical literacy as early as possible within formal education.

Researchers, students, academics and scientists in general need to develop critical literacy skills and awareness of the moral and ethical principles that should govern their research journey, and the way the use other researchers' work.

In this paper we revisited Blooms taxonomy and by consolidating more recent contributions and our collective knowledge we represented an inverted hierarchy showing that as the levels rise the learner is not only able to do more but also demonstrates higher level cognitive skills. We then identified current issues created by the proliferation of fake news, misinformation, disinformation and malinformation and the dangers posed by these practices. We reported current practices in developing critical thinking in the authors' respective institutions and concluded that it is imperative to develop awareness and curricula for critical literacy.

We customised the moral and ethical concepts suggested by the US Content Subcommittee of the ImpactCS Steering Committee, and we customized them to flag the ethical concerns over misinformation, disinformation and malinformation.

Experiences gained through our collective participation in local, regional, national, European and international levels will inform future work. Further work will see the development of a customisable framework for the introduction of Process Improvement for Critical Literacy for educators and librarians in order to develop their students' reasoning and critical thinking skills for effective evaluation of information.

It is only through the collaboration of librarians and academics that progress can be achieved in this crucial effort to educate future generations of students, researchers and the public at large, so they can successfully navigate the treacherous sea of mis-information, dis-information and mal-information.

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